

REMARKS/ARGUMENTS

Claims 23-25 have been rejected under 35 USC 102(e) as being anticipated by Ellenbogen (US 6,339,227), which is said to show a three terminal device having a pair of tunnel junctions and a molecule that is effectively an island having energy bands of molecular orbitals therebetween. However, the device described by Ellenbogen is not “an island formed of a material having a non-uniform density of energy states characterized by separated conduction and valence bands that behave as continuous energy bands” as recited in claim 23 of the present application. Consequently, the Ellenbogen reference cannot anticipate the present claims.

The cited reference, Ellenbogen, describes a device best classified as a resonant tunneling transistor (RTT) structure. It operates by using a gate-like terminal to bring the energy levels of a central or channel region between two tunnel junctions into resonance (i.e., the same energy level) with the Fermi level of the conductor of the contacts to the tunnel junctions. More simply put, the energy level of the channel region is made to line up with the energy level of the leads contacting the tunnel junctions so as to permit conduction.

In the Ellenbogen reference, the channel region consists of a molecule, the energy levels of which are discrete in nature. The most relevant levels in this molecule for conduction are the HOMO (highest occupied molecular orbit) and the LUMO (lowest occupied molecular orbit), which are separated by an energy gap. Generally, the LUMO must be lined up with the Fermi level of the leads in order for conduction to occur. Importantly, the LUMO is one single energy state, such that there are no energy states in the molecule just above or below the LUMO.

This discrete nature of the energy states of the “island” molecule described by Ellenbogen is quite different from what is claimed in the present application. Claim 23 recites an island having a valence and a conduction band, which behave as continuous (and NOT discrete) energy bands. This is a fundamental distinction between the RTT device described by Ellenbogen and the presently claimed invention and, hence, the present claims are patentable over Ellenbogen.

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Respectfully submitted,
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